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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/995,736	11/29/2001	Zakya H. Kafafi	N.C. 82,530	1869

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EXAMINER

KEANEY, ELIZABETH MARIE

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/995,736

Applicant(s)

KAFAFI ET AL.

Examiner

Elizabeth Keaney

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26, 29-39 and 42-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26, 29-39 and 42-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

The Remarks and Amendments filed 11 July 2005 have been entered.

#### ***Response to Arguments***

Applicant's arguments filed 11 July 2005 have been fully considered but they are not persuasive.

Applicant argues that Shirasaki (US Patent 5,895,692) fails to disclose the claimed universal host because the universal host was not in existence on the effective filing date of Shirasaki.

The Examiner respectfully disagrees. The term universal host fails to have any special definition in the instant application; therefore any single layer comprising red, green and blue dopants is considered a universal host. Since Shirasaki teaches, in figure 10, a host layer (22) comprising red (13a), green (13b) and blue (13c) dopants, Shirasaki discloses a universal host. Accordingly, the rejection is maintained.

Applicant further argues that Shirasaki fails to teach a combination of energy transfer and direct carrier recombination.

The Examiner respectfully disagrees. First, the limitation is found only in the preamble and has no limitations linking back to this feature. Therefore, no patentable weight is afforded to this limitation. Secondly, the limitation is an inherent property of any OLED structure. In order for light emission to occur within an electroluminescent layer, electrons must be excited to a higher level (energy transfer) and then when the

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electrons are coming down out of the excited state (recombination) the lost of energy results in light emission.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., electron host recombination on the guest molecule) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-26,29-39 and 42-55 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the red, green and blue dopants. The language in the claim states "a single universal host can be used for red, green and blue dopants". The term "can be" provides no positive recitation of the dopants as part of the display. A full-color display cannot be realized without dopants present in the device.

The Examiner suggests amending the claims as follows: "a single universal host including red, green and blue dopants".

The Examiner notes that while this correction was made to claim 1, no corrections were made to any other claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5, 7, 10-13, 16-18, 20, 22, 25, 26, 29, 30-33, 35, 38, 39, 42, 43, 45 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Shirasaki (US Patent 5,895,692).

Re claim 1: Shirasaki discloses, in figure 10 and throughout the disclosure, an organic light emitting diode (10), comprising:

- a single universal host (22; bipolar transport layer) including at least one red (13a), green (13b) or blue (13c) dopant for full color display (column 2, line 67-column 3, line 3), as specified by the CIE for red, green and blue dopants;
- a hole transporting layer (21);
- an electron transport layer (14);
  - wherein the hole transporting layer and the electron transport layer are on opposing sides of the universal host, and are in electrical

contact with the universal host and comprise an active portion of the OLED;

- electrodes on opposing sides of the active portion (12,15) for providing a bias across the active portion;
  - wherein at least one of the electrodes is transparent (column 5, line 35).

The Examiner notes no patentable weight has been afforded to the limitation “characterized by...recombination mechanisms” because it is found only in the preamble and no other feature refers back to the limitation.

Re claims 16,29 and 42: Shirasaki discloses, in figures 1 and 7b and throughout the disclosure, an OLED (10) comprising:

- a hole transporting layer (16) that is also a single universal host including at least one red, green or blue dopant (column 4, lines 61-66);
- an electron transport layer (14);
  - wherein the hole transporting layer and the electron transport layer are placed in series, and are in electrical contact with each other;
  - wherein the hole transporting layer and the electron transport layer together comprise an active portion of the OLED;
- electrodes on opposing sides of the active portion (12,15) for providing a bias across the active portion;

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- wherein at least one of the electrodes is transparent (column 5, line 34).

Re claim 16: Shirasaki further discloses diffusing the red, green and blue dopants within the electron transporting layer, rather than the hole transporting layer (column 6, lines 50-53).

Re claims 2,17 and 30: Shirasaki discloses dispersing a blue pigment within the universal host/HTL/ETL (13c). Therefore, Shirasaki discloses the universal host/HTL/ETL to be adapted to emit at wavelengths in the blue visible light region.

Re claims 3,18,31 and 43: Shirasaki discloses doping the universal host/HTL/ETL with a red emitting material (13a).

Re claims 5,20,33 and 45: Shirasaki discloses doping the universal host/HTL/ETL with a green emitting material (13b).

Re claims 7,22,35 and 47: Shirasaki discloses doping the universal host/HTL/ETL with a blue emitting material (13c).

Re claims 10,11,25,26,38 and 39: Shirasaki discloses, in figures 1 and 10 and throughout the disclosure, at least one of the transparent electrodes comprising:

- a glass substrate (2) coated with ITO (column 5, line 34).

Re claims 12 and 13: Shirasaki discloses, in figures 1 and 10 and throughout the disclosure, one of the metallic cathode electrodes (15) comprises an alloy of Mg (column 5, line 40).

***Claim Rejections - 35 USC § 103***

Claims 4,6,9,19,21,24,32,34,37,44,46,49,50,51,52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki as applied to claims 1,16,29 and 42 above, and further in view of Murata et al. (Proc. SPIE, 3476,88(1998); hereinafter Murata) and Noda et al. (J. Am. Chem Soc., Vol 120 (1998); hereinafter Noda).

Re claims 4,6,9,19,21,24,32,34,37,44,46 and 49: Shirasaki discloses all the limitations as shown above, including an electron transporting material, and a red and green pigment material.

However, Shirasaki fails to teach or fairly suggest the universal host/electron transporting material/hole transporting material comprising BMB-2T, the red pigment material comprising DPP and the green pigment material comprising DEQ.

Noda discloses BMB-2T as an electron transporting material or hole transporting material (column 2, lines 3-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute BMB-2T for the universal host/HTL/ETL material



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because it improves the luminosity and quantum efficiency of the device (Noda; column 4, lines 34-36).

Murata discloses the use of DPP as a red pigment material and DEQ as green pigment material.

Absent of solving any long standing need or problem, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute DPP for the red pigment of Shirasaki and DEQ for the green pigment of Shirasaki because the selection of one pigment material over another is considered to constitute an obvious design variation based on the availability and cost of the materials.

Re claims 50 and 51: Shirasaki discloses, in figures 1 and 10 and throughout the disclosure, at least one of the transparent electrodes comprising:

- a glass substrate (2) coated with ITO (column 5, line 34).

Re claims 52 and 53: Shirasaki discloses, in figures 1 and 10 and throughout the disclosure, one of the metallic cathode electrodes (15) comprises an alloy of Mg (column 5, line 40).

Claims 8,23,36 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Lin et al. (US Patent 6,512,122; hereinafter Lin).

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Shirasaki discloses all the limitations as shown above, including a hole transporting layer.

However, Shirasaki fails to teach or fairly suggest the hole transporting layer comprising 4,4-bis(1-naphthylphenylamino)biphenyl.

Lin discloses a hole transporting layer comprised of 4,4-bis(1-naphthylphenylamino)biphenyl (column 8, lines 10-11).

Absent of solving any long standing need or problem, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute 4,4-bis(1-naphthylphenylamino)biphenyl for the HTL of Shirasaki because the selection of one HTL material over another is considered to constitute an obvious design variation based on the availability and cost of the materials.

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki in view of Baldo et al. (US Patent 6,097,147; hereinafter Baldo).

Shirasaki discloses all the limitations as shown above.

However, Shirasaki fails to teach or fairly suggest a hole-blocking layer made of bathocuproine.

Baldo discloses, in figure 2 and throughout the disclosure, a hole blocking layer (114) comprised of bathocuproine (column 4, line 35) inserted between the light emission layer (113) and the electron transport layer (115), and wherein the hole blocking layer, hole transporting layer and electron transport layer are in electrical contact with the light emission layer.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a hole-blocking layer to the OLED disclosed by Shirasaki because with the addition of the hole-blocking layer, the excitations produced in the emission layer are blocked from diffusing into the electron transport layer thereby confining the excitations only to the emission layer. By confining the excitations within the emission layer the overall brightness and efficiency of the OLED is enhanced (column 3, lines 47-50).

Claims 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirasaki, Noda and Murata as applied to claims 1,43 and 44 above, and further in view of Baldo.

Shirasaki, Noda and Murata disclose all the limitations as shown above.

However, they fail to teach or fairly suggest a hole-blocking layer made of bathocuproine.

Baldo discloses, in figure 2 and throughout the disclosure, a hole blocking layer (114) comprised of bathocuproine (column 4, line 35) inserted between the light emission layer (113) and the electron transport layer (115), and wherein the hole blocking layer, hole transporting layer and electron transport layer are in electrical contact with the light emission layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a hole-blocking layer to the OLED disclosed by Shirasaki because with the addition of the hole-blocking layer, the excitations produced in the emission layer

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are blocked from diffusing into the electron transport layer thereby confining the excitations only to the emission layer. By confining the excitations within the emission layer the overall brightness and efficiency of the OLED is enhanced (column 3, lines 47-50).

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Keaney whose telephone number is (571)272-2489. The examiner can normally be reached on Monday, Tuesday, Thursday, Friday 7:30-6:00.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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